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Factors Affecting Milk Supply in Akron, Canton, Dayton, and Portsmouth, Ohio

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FACTORS AFFECTING MILK SUPPLY IN AKRON, CANTON, DAYTON, AND PORTSMOUTH, OHIO

C. G. McBRIDE AND R. W. SHERMAN

SUMMARY

This is a study of the factors that influence farm shipments of milk to four typical Ohio cities—Akron, Canton, Dayton, and Portsmouth. The years 1939 to 1943, inclusive, are covered in all markets. In the Canton analysis 1938 is included, and in Portsmouth the records covered 1934-1943. Emphasis is placed on the 5 years 1939-1943, which comprise 3 years of prewar and 2 years of wartime conditions.

Shippers who show in the market records as withdrawals fall into two groups—(1) those who stop producing milk for the market and (2) those who shift to some other market or are involved in some shift of operation that causes them to appear as withdrawals in market records. Withdrawals in the four markets from all causes were highest in 1942, with 573; next was 1941, with 528. Lowest of the 5 years was 1943, with 411. Those who went out of milk production represented about one-third of the total. The dominant causes for withdrawal given for this group were retirement, ill health, and death. The highest number was 182 in 1942. The next reason in importance for stopping milk production was other employment. These withdrawals reached a high point of 94 in 1941; they dropped to 60 in 1942, and to 39 in 1943.

In all the markets the withdrawals and additions of shippers exceeded in numbers the farms that were involved. This is due to shifting of producers from one farm to another and to the fact that once a farm is equipped to meet the city health standards it tends to remain in market milk production. In a period of 5 years a farm may have several different shippers.

Akron market.—Demand so increased in this market that by October 1942 the total farm shipments were not equal to Class I and II milk requirements of dealers.

June shipments compared with November have increased sharply since abandonment of the quota plan.

The effect of shift of shippers into industrial employment reached its peak in 1941. The average size of herds of these shippers was slightly below the average of all withdrawals.

The average number of cows per farm for the market in 1943 was 11.3, while the average for all shippers who withdrew in 1939-1943 was 8.96 cows.

Additions to the market had an average of 11.5, compared with 8.96 for the withdrawals.

Canton market.—In this market, base plan was not used to limit production. The members of the Stark County Milk Producers Association were invited to increase production for 1942.

Total market receipts increased approximately two and a half million pounds in 1942 over 1941 and two and three-fourths million pounds in 1943 over 1942.

There was an upward trend of average daily shipments per farm from 158 pounds in 1938 to 194 pounds in 1943.

One hundred and ninety-three farms in the area that had at some time during 1938 to 1943 shipped milk to the market were not producing milk in December 1943. This compares with 70 farms that were known to have come into the market as new in milk production.

When the last year of farm shipments of all shippers who withdrew was compared with the first year's shipments of all who came in as additions, there was a gain of 21.5 per cent in favor of the additions.

Dayton area.—This area, with an increase of 15.6 per cent in population between April 1, 1940 and March 1, 1943, had the most difficult supply situation. The base and surplus plan in the market was replaced by a plan of bonus for quantity and quality of shipments.

Dayton market suffered heavy loss of shippers. The largest number was due to one of four related reasons—sale of farm, retirement, ill health, or death. This market had a relatively large number shut off by the Board of Health in 1939, 1940, and 1941.

About half of the shippers who stopped producing milk remained on the farm. Many of these men went into industrial employment but continued to live on the farm.

The opinion of agricultural leaders in the production area was that the opportunities for good returns in other farm enterprises would tend to limit increase in milk shipments.

Portsmouth market.—This area lost population in 1940 to 1943 and, therefore, lacked the pressure of demand present in the other markets.

With a decrease in shippers from 250 in 1934 to 175 in 1942, the total market receipts increased 1,631,000 pounds. During this period a shipper was permitted to sell allotted base to another.

Retirement, ill health, and death were the leading reasons for withdrawals. Next was shift to manufacturing plants.

There was a striking contrast in this market between the farms with largest shipments and the shippers as a whole. These four farms shipped 13.2 per cent of the milk in October 1942 and only 9.7 per cent in December 1943.

Comparison of the four markets.—When total farm shipments of the entire year were compared with those of the fall months, it is evident that the fall quarter was losing in the percentage it represents of the whole.

When shipments were reduced to an average daily basis and the farms of large average daily shipments were compared with those for the entire market, it showed that the large shippers in the fall months were falling behind the market as a whole.

INTRODUCTION

This is an analysis of recent changes in the market milk supply of four representative cities of Ohio. Milk supply was changed by increase or decrease in shipments of the producers shipping to the market and by additions to and withdrawals of farms supplying the market. In order to obtain a picture of these changes a study was made of the records of health boards, producer associations, and auditing agencies in the four markets. Additional information was gotten through interviews with inspectors, managers of producer associations, and market auditors. Several hundred questionnaires were sent to shippers who had withdrawn from or had come into these markets in the period covered by the study.

Of the four cities selected to give a range of conditions, three—Akron, Canton, and Dayton—were gaining in population during the 3 years, 1941-1943, while Portsmouth was losing. There are other marked differences such as size of farms, returns from competitive farm enterprises, and transportation conditions. The emphasis in the study was placed upon shipper changes with respect to the market. There are several ways in which the supply of milk going into a particular market may be affected. The most important situations are:

1. The shipper quits and is replaced by another who continues in the market. This results in no change in the number of farms; the amount of milk delivered may change, depending upon the milk shipments of the two shippers involved.

2. The producer stops shipping milk but remains on the farm in a different type of farming. The result is a loss to the market of both farm and shipper.

3. A farmer who was not shipping milk to the market moves on to a farm that was not in the market and ships milk to the market, or a farmer in the area not shipping market milk begins to ship. The result in either case is an addition of both a shipper and a farm to the market.

4. A shipper in the market changes to another market without moving from the farm he now occupies. The result is a loss to the market of both farm and shipper but not a net loss in volume of market milk.

5. A shipper of market milk may change from another market to the one being studied. The result is a gain of a farm and a shipper but no gain in total volume of market milk.

6. A change of business organization on a farm in the market, such as shift from father to son. As a result shipper records show a withdrawal and addition but actually there is no change either in number of farms or of shippers.

7. Shippers already in the market may increase or decrease shipments due to such factors as labor, feed supplies, and marketing plan.

The main objective in this research into the milk supply was to obtain an accurate picture of the effect of the changes that take place among producers shipping regularly into the market.

The milk supply of a city consists of the milk shipments of a group of farms. If topography, soils, and other natural factors affecting agricultural production are about the same in the area surrounding the city, the milkshed will be bounded roughly by a circle with a radius long enough to insure an adequate year-round supply of milk and cream.

This pattern may be changed as a result of lack of uniformity in the factors mentioned above and also by producer attitudes. Some farmers have no liking for dairying and others who are willing to milk cows find certain obstacles to overcome. One of these factors is the cost of preparing the farm to meet the sanitary requirements of the board of health. If the farmer is a tenant he may feel that the landlord should bear this cost. As a rule a milk manufacturing plant will not require as much in the way of farm standards as a city dealer. These factors serve to sort shippers into those selling for the city supply and those going to manufacturing plants.

Once in the market the shipper's permanency depends upon several factors. He may retire or greatly reduce his dairy enterprise because of health or other personal reasons. Better opportunities in other farm enterprises or outside employment may lure him away. The board of health may impose new demands which he cannot or will not meet. Sometimes economic changes over which he has no control, such as rerouting of milk trucks, may take him out of the market.

The study covers, in the main, data to the end of 1943, but, since completion of the field work and receipt of the questionnaires, later current market reports have been received from these markets. From these it has been possible to make a comparison of market receipts in the first quarter of 1944 with preceding years. An upswing is evident in March, 1944, which under favorable conditions might become more pronounced in April, May, and June. The problem of caring for sharp increases in supply at present is very serious because of the limitations of sales under War Food Order 79, manpower shortage at processing plants, and transportation difficulties.

AKRON MARKET AREA

Characteristics of the area.—The Akron market area is in the highly industrialized part of the State with important fluid milk markets on all sides, with the exception of the west. The census estimate of population shows Summit County to have increased from 339,405 to 359,276, or 5.9 per cent, from April 1940 to March 1943. This county includes the area supplied by milk dealers of Akron in addition to some small markets not supplied by them. Most of the population increase of 19,871 was no doubt either in Akron or its environs furnished with milk from supplies in the Akron market.

On the assumption that the per capita consumption of milk and fluid cream was the same for the Akron consumers as was shown for consumers in the Canton market, it was possible to make an estimate of the effect of increase in population on milk requirements. It would have taken 6,259,365 pounds of milk to supply the increase in population for one year. On a daily basis this means 17,150 pounds, which was 7.7 per cent of the daily deliveries of November 1943. Increased demand for milk and cream per capita, added to

the demand created by the influx of population, raised the total needs for Class I and II milk enough so that by October 1942 the total market receipts were not enough to supply such needs.

History of marketing plans.—A quota plan was adopted by the Milk Producers Association of Summit County in January 1932 for the Akron market for the purpose of limiting production in the months of flush production and to encourage production during the fall months of short production. The quotas for the producers were established at 60 per cent of their shipments of September 1, 1930 to September 1, 1931. The percentage for quota was determined by the per cent of milk going into milk and cream sales.

Adjustments for individual shippers were provided for to take care of herd conditions which were beyond the owner's control. Such adjustments, as well as relief from loss of quotas, were handled by the Sales Committee of the Producers Association. Penalties in the form of loss of part of the quota were provided when individuals fell below their quota for a certain period. A 20-year record of producer performance is given in table 1.

TABLE 1.—Average daily shipments and comparison of June and November with average for the Akron market. 1924-1943

Year	Average daily farm shipments	Per cent of average		Per cent variation of June over November of same year
		June	November	
	Pounds			
1924	234,971	129	84	54
1925	274,744	125	89	40
1926	279,405	134	83	61
1927	284,667	130	86	51
1928	308,800	128	82	56
1929	318,131	138	86	60
1930	350,785	128	87	47
1931	359,330	127	84	51
1932	258,999	117	81	44
1933	260,839	111	87	28
1934	259,317	116	84	38
1935	254,793	129	82	57
1936	248,799	124	86	44
1937	240,902	121	88	37.5
1938	243,775	117	88	33
1939	226,320	111	92	21
1940	227,998	114	91	25
1941	251,090	112	96	17
1942	254,628	110	92	20
1943	267,145	120	84	43

Various adjustments in the quota percentage from the 60 per cent for 1932 resulted in a 1933 quota of 53 per cent, for 1934 of 54 per cent, for 1935 of 53 per cent, for late 1936 of 58 per cent, and for 1937 of 67 per cent. From this time on to October 1942 quotas were gradually increased until in October 1942 the amount shipped by producers was insufficient to fill Class I and II needs. The quota plan was discontinued at that time and the market reverted to a flat price plan for milk with no plan for control of production.

For the 8 years prior to the inauguration of the quota plan, the June farm shipments of milk averaged 52.5 per cent higher than the following November. During the 11 years of its operation, June averaged 33 per cent higher than November. For the last 5 years before abandonment of the quotas, the corresponding percentage was only 23. The first year after its abandonment the June shipments were 43 per cent above the following November shipments.

TABLE 2.—Number of shippers and number of cows classified by reasons for discontinuing shipment of milk to the Akron market. 1939-1943

Reason	1939		1940		1941		1942		1943		Total		Cows per farm
	Shippers	Cows	Shippers	Cows	Shippers	Cows	Shippers	Cows	Shippers	Cows	Shippers	Cows	
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Transferred to other fluid market	21	173	20	210	17	215	12	162	13	129	83	889	10.7
Transferred to manufacturing outlet	14	147	13	114	8	78	1	6	8	76	44	421	9.6
To industry	29	197	40	319	47	408	31	287	10	91	157	1302	8.3
To other business	12	62	7	72	13	103	2	18	3	16	37	271	7.3
Change in type of farming	7	32	14	105	6	44	5	45	5	35	37	261	7.1
Retired, ill health, or death	23	118	20	155	49	397	42	399	28	231	162	1300	8.0
Operator or son drafted	.....	.....	1	24	2	12	5	54	2	15	10	105	10.5
Lack of help	.....	.....	4	36	.....	.....	6	96	4	45	14	177	12.6
Moved out of territory	14	102	18	191	13	121	18	204	5	32	68	650	9.6
Shut off by board of health or disease in herd	10	47	8	44	7	64	2	27	7	54	34	236	6.9
Farm taken for arsenal or dam	.....	.....	13	144	5	81	2	36	.....	.....	20	261	13.1
Sold out	16	132	17	192	22	218	32	366	21	189	108	1097	10.2
Farm out but reason unknown	.....	.....	.....	.....	.....	.....	.....	.....	30	275	30	275	9.1
No information concerning farm or shipper	38	554	63	530	17	145	72	531	.....	.....	190	1750	9.2
Total	184	1554	238	2136	206	1886	230	2231	136	1188	994	8995	9.0

Withdrawals and additions of shippers.—In analyzing the changes in milk shipments to the Akron market an attempt was made to follow the farm rather than the individual shipper. It was felt that this was the important factor in the supply for the market. When a shipper discontinued selling to the Akron market but it was known that milk continued to come from that farm to Akron, it was not considered a withdrawal. It was not possible to determine this in all cases, especially for the changes in the earlier part of the 5-year period, but it was possible to get such information for the majority of the changes. The data for the year 1943 probably contains very few instances where the withdrawal was not for the farm as well as for the producer. For the latter year there were on record 216 producers who withdrew, but of these 80 were merely changes of name on the same farm. No reason was obtained for 30 withdrawals in 1943. In all 30 of these cases it was known that the farm was no longer producing for the Akron market. For the previous 4 years there was a considerable number of farms on which information was not available on both the shipper and farm. Table 2 is divided in such a way that these latter farms and shippers are not included in comparisons with 1943.

The reason given most frequently for withdrawal was one of three—retirement, death, or poor health. A reason that ran a very close second was that of producers going to industry. The effect of shift into industry on the discontinuance of sale of milk to the Akron market had reached its peak in 1941 and by 1943 accounted for only about one-fifth as many withdrawals as in the peak year. The average size of herds of those shippers going to industry was slightly below average for all herds of those withdrawing. Other neighboring markets were responsible for taking 83 shippers from the Akron market during the 5 years, while 44 shippers went to manufacturing outlets. The attraction into other farm enterprises and to other business accounted for loss of shippers during the period under study, but it is evident that for the last 2 years opportunities offered by industry, business, and other farm enterprises have become of much less importance in their effect upon milk shippers to the Akron market.

Information as to what had happened to the farm was available concerning 334 farms from which milk was no longer sent to Akron. See table 3. Of the 334 farms, 271, or 81 per cent, no longer produced milk. Of the 63 farms which were still shipping, 40 were shipping to another fluid market, 19 went to manufacturing outlets, and four went for sour cream.

Those who discontinued shipping milk to the Akron market were divided into four groups, based on size of their dairy herds before they dropped out. Apparently shippers in all of these groups had been affected about the same by those influences causing withdrawals. See table 4.

It will be noticed that, while only 7 per cent of the shippers furnishing milk for the Akron market in July 1943 had less than six cows, 19 per cent of those who withdrew in the 5-year period had less than six cows. The reverse holds true of the large shippers with 16 or more cows. Eighteen per cent of the Akron shippers had more than 15 cows, but only 8 per cent of those withdrawing were in this classification.

The average number of cows per farm for all farms shipping to Akron in 1943 was 11.3, while the average for all producers who had withdrawn over the period of the study was 8.96 cows per farm. There was a slight decrease in the percentage of shippers with over 10 cows withdrawing during 1942 and

TABLE 3.—Disposition of farm with reference to milk shipments of 334 farms from which shipment of milk to Akron was discontinued

Disposition of farm	1939		1940		1941		1942		1943		Total	
	Farms	Cows	Farms	Cows	Farms	Cows	Farms	Cows	Farms	Cows	Farms	Cows
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
To other fluid market.	9	57	1	6	9	96	7	96	14	135	40	390
To manufacturing outlet	5	39	1	12	4	42	3	36	6	61	19	190
Sour cream	1	3	.....	.....	1	12	1	12	1	6	4	33
Out of production	43	243	48	382	58	508	56	557	66	557	271	2247
Total	58	342	50	400	72	658	67	701	87	759	334	2860

TABLE 4.—Number of shippers who withdrew from the Akron market and shippers as of July 1943 classified by number of cows per farm

Cows	Shippers withdrawing from the market in												All shippers as of July 1943	
	1939		1940		1941		1942		1943		Total			
	No.	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
1- 5	36	20	45	19	43	21	34	15	29	21	187	19	146	7
6-10	103	56	132	56	110	53	138	60	81	59	564	56	991	50
11-15	33	18	48	20	37	18	35	15	13	10	166	17	488	25
Over 15	12	6	13	5	16	8	23	10	13	10	77	8	346	18
Total	184	100	238	100	206	100	230	100	136	100	994	100	1972	100

1943. For the 5-year period 25 per cent of those withdrawing had more than 10 cows, while 43 per cent of the shippers in the market in 1943 had more than ten.

While 19 per cent of the shippers withdrawing in the 5-year period had five or fewer cows, only 9 per cent of the new shippers coming into the market were in this group. For the group of shippers with six to ten cows, the percentage for the withdrawals was 56 and for the new shippers 48. Seventeen per cent of those withdrawing were in the group of 11 to 15 cows, while 24 per cent of the new shippers were in this group. The biggest difference between the withdrawals and additions came in the group with more than 15 cows. While only 8 per cent of the withdrawals were in this group, 19 per cent of the additions had 16 or more cows.

On the basis of these percentage comparisons, for each group of withdrawals replaced by the same number of additions, a gain of about 20 to 25 per cent in number of cows could be expected.

Additions to the market.—Information relative to the additions coming into the Akron market was obtained for the same period as for those dropping out. There were 779 additions to the market from January 1, 1939 to December 31, 1943. These new shippers had an average of 11.5 cows per farm as compared to an average of 9.0 cows for the withdrawals. Information relative to the sales outlets which these additions used prior to selling to Akron dealers was obtained from farmers in each township of the Akron market area who were familiar with milk marketing in their neighborhoods. These data are summarized in table 5.

This tabulation includes all additions coming in the Akron market for the period of the study. It is possible that some of the 182 farms on which no information was obtained had shipped to the market under some other name. For all others, with the exception of the seven who had previously retailed in the Akron market, neither the farm nor the shipper had sold to the Akron market in recent years.

Of the 597 farms for which information on the previous outlets were obtained, 340, or over half, had been producing for some other fluid market just prior to entering the Akron market. One hundred and forty-six, or 24 per cent, had not been producing milk for fluid sale at all. It was not learned whether any of these farms had at any former time produced milk for sale in fluid form. Eighty-five of those 146 farms had produced no milk within recent years and probably were in no way equipped prior to entering the market for Akron fluid sales.

Those new farms coming into the Akron market which had been producing sour cream had an average of 9.5 cows per farm, which, along with those farms which had been producing for condenseries, was the lowest for any of the groups of farms. The group with the highest average number of cows per farm was the one composed of producers who had been producing for other fluid markets.

Table 6 is a classification of the new producers by number of cows per farm made on the same basis as for the producers dropping out. The average size of herds taken into the Akron market has been decreasing over the last two or three years. This is evident by the fact that, in 1939, 56 per cent of the new farms had 11 or more cows, in 1941, 57 per cent of all new farms had this number of cows per farm, and in 1943 the percentage of new farms with

TABLE 5.—Outlets used for milk previous to selling to Akron by those shippers who started to ship to the Akron market January 1, 1939 or later

Previous outlet for milk	1939		1940		1941		1942		1943		Total		Average number of cows per shipper
	Shippers	Cows	Shippers	Cows	Shippers	Cows	Shippers	Cows	Shippers	Cows	Shippers	Cows	
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	
Sour cream	6	51	18	169	8	79	23	238	6	43	61	580	9.5
Cheese factory	3	60	3	26	1	19	11	135	5	38	23	278	12.1
Condensery	14	141	8	89	4	40	16	141	39	359	81	770	9.5
Fluid market other than Akron	48	665	59	750	34	528	85	1088	114	1121	340	4152	12.2
No former milk production	3	43	10	102	11	125	7	98	54	474	85	842	9.9
Formerly retailed in Akron	.....	.....	2	24	.....	.....	2	20	3	41	7	85	12.1
No information	19	255	64	827	41	493	58	649	.....	.....	182	2224	12.2
Total	93	1215	164	1987	99	1284	202	2369	221	2076	779	8931	11.5
Average per farm	.....	13.1	.....	12.1	.....	13.0	.....	11.7	.....	9.4	.....	11.5	.....

TABLE 6.—New shippers for Akron market classified by number of cows per shipper

Cows	Shippers entering the market in												All shippers as of July 1943	
	1939		1940		1941		1942		1943		Total			
	No.	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
1- 5	8	9	12	7	8	8	16	8	24	11	68	9	147	7
6-10	33	35	77	47	34	35	92	45	140	63	376	48	991	50
11-15	25	27	35	21	33	33	58	29	39	18	190	24	488	25
Over 15	27	29	40	25	24	24	36	18	18	8	145	19	346	18
Total	93	100	164	100	99	100	202	100	221	100	779	100	1972	100

this number of cows was only 26. This change can be accounted for to a large degree by the fact that a much larger number of new farms were taken on where there had been no former milk production and herds were small.

CANTON MARKET AREA

Characteristics of the area.—This area is called the Canton Market Area. Stark County in reality is the market sales area. The most important cities in addition to Canton are Massillon and Alliance. Practically all dealers selling in the area buy their milk from the Stark County Milk Producers Association. A market pool is operated by the Stark County Milk Marketing Board, an incorporated agency created for this specific purpose. Its board of directors consists of three dealers and three producers.

Like other industrial areas, Stark County had a marked growth in population within the last 3 years of the period studied. Between April 1, 1940, the date of the 1940 census, and March 1, 1943 when an estimate of population was made by the Census Bureau, based on distribution of War Ration Book No. 2, Stark County had a population gain of 13,620. A comparison of the increase of farm sales of milk with that of population growth in the 3 years involved is of interest. In 1940 total receipts in the market pool were 61,011,058 pounds, of which 36,658,223 pounds, or 60 per cent, were sold as fluid milk and sweet cream. In 1943 total receipts were 67,540,798 pounds, of which 49,982,201 pounds, or 74 per cent, were sold as fluid milk and sweet cream. The increase of fluid milk and cream sales was 13,323,978 pounds.

In a recent study[1] of milk and cream purchases of 583 families in Stark County it was found that milk purchases averaged 365 quarts and cream purchases 36 half pints per day for each thousand persons. If the 13,620 new residents purchased milk and cream at this rate, a total of 4,289,955 pounds of milk was required to supply this demand. The remaining 9,034,023 pounds could be considered as the increase in per capita purchases on the part of the original population. The average daily sales per farm were 160 pounds in November 1943, the month of lowest market receipts for the year. At this rate of farm shipments approximately 73 farms were needed to account for the increase in population and 155 to supply the 9 million pounds of increased market demand, providing all milk received had been used in fluid milk and cream sales.

History of marketing plans.—Any study of trends in supply should take into account the marketing plans that have been in effect during and preceding the period of the study. This market has had an interesting history with respect to the use of the base and excess plan. In the early 30's the market was operating as a market pool but without any provision for individual producers' bases.

On October 1, 1934 the market was placed upon what was called a "modified base and excess pool plan." Producer bases were established upon the average daily shipments of each producer during the first 4 months of 1934. The rules provided that any producer who shipped less than 80 per cent of his assigned base for a period longer than 60 days might have it reduced to the average of the period of under base shipments.

[1]Department of Rural Economics Mimeographed Bulletin No. 163, "Effect of Every-other-day Delivery on Milk Purchases in Stark County, Ohio."

Total monthly average of assigned base was approximately 3,700,000 pounds. The average monthly requirements of the dealers buying through the Stark County pool for fluid milk and cream sales were approximately 2,900,000 pounds. The result of this wide difference between assigned base and milk and cream sales in the market was that the base pool included a considerable amount of milk that went into Class 3 for manufacturing. For example, in 1937 total pool receipts were 63,248,858 pounds, of which 52.16 per cent was in Classes 1 and 2 (i. e., fluid milk and sweet cream), and 47.84 per cent was in Class 3 used for manufacturing.

It is evident that producer average returns were influenced by two factors. In pooling on use classification as was done here, the larger the percentage in fluid milk and cream sales the higher the pool price. Also, a result of the base and excess feature of the plan the producer with uniform production received a relatively better return than the one with wide seasonal variation.

It should be kept in mind that in this market it was never the aim of the management of the cooperative association to limit assigned base to the fluid milk and cream requirements of the cooperating dealers. The policy was clearly set forth in the association's annual report for 1940 as follows:

> "In a number of markets, as is true in our market, no particular stress was placed upon endeavoring to fit assigned bases to fluid milk and cream requirements, for the reason that fluid milk and cream uses do not absorb a sufficient volume of total receipts to permit the establishment of bases at a point that will use a sufficient amount of total shipments by producers, and in these markets bases are assigned and adjusted on individual production."

It is significant that in this same annual report distributed to the members in the early winter of 1941 producers were invited to expand production in the following statement.

> "In recent years no stress has been made toward limiting production and as frequently announced under our plan, each producer can determine the amount of milk he desires to produce and ship. The only recommendation that has been made is that shipments be made as uniformly as possible. However, this fact may not be entirely clear to all producers for occasionally statements are made that production has been curtailed to keep surplus milk off the market. With the sharp return in industrial conditions and with upward trends in fluid milk and cream sales, this question can be definitely cleared up, for there is now no apparent need for producers to curtail production so far as markets are concerned. This matter should, therefore, be determined entirely on the basis of the producers farm management program."

A detailed analysis of producer marketing under the base plan in the 3 years, 1935, 1936, and 1937, was made by this department and reported in Bulletin 614 of the Ohio Agricultural Experiment Station.[2] A representative sample of 100 producers was arranged on the basis of returns for all milk shipped adjusted to a 3.5 butterfat test. The differences in returns per hundred pounds between the producer with the best performance record and the one with the poorest were as follows: in 1935, 42 cents; in 1936, 27 cents; and in 1937, 30 cents. We are here concerned with the base plan as it may

[2]Ohio Agricultural Experiment Station Bulletin 614, 1940, "The Ohio Farmer and His Milk Market."

affect farm shipments through the market pool. When from the 100 producers there were selected the 11 producers with highest returns and the 11 with lowest returns, it was found that both high- and low-return groups were increasing in total sales for the year but at different rates. The low-return group increased 37.1 per cent, while the high-return had an increase of only 11.6 per cent. This would seem to indicate that in this time of upswing in farm shipments of milk that the farmers with the more uniform shipments were producing nearer to their optimum capacity in 1935 than were those who were marketing large quantities of excess over base.

The policy of the Stark County Milk Producers Association with respect to assignment of base is significant at this point. In line with the aim of assigning base in accordance with ability to deliver the low-return group received an increase in base assigned of 47.9 per cent, while the high-return group was increased only 3.1 per cent. These facts are given here to show that during this period there was some encouragement given to the producer to increase his shipments and to maintain them on a uniform basis. After these adjustments of assigned base, the low-return group in 1937 delivered 96 per cent of assigned base and the high-return group 93.7 per cent.

In table 7 the percentages of use classification and the yearly average pool price are shown for a 6-year period. It will be noted that beginning with 1940 there was a marked upward trend in total receipts, in percentage going into fluid milk and cream, and in average price paid producers.

Not all of the increased return to producers came from the more favorable classification. The period covered by this study was one of generally rising retail prices. For most of the time Canton was one cent higher than Massillon and other submarkets. The prices as published by the Stark County Milk Marketing Board are given in table 8.

Numbers and daily shipments of producers.—The original research of this study was devoted in the main to the character of changes in the supply as determined by the behavior of producers. Table 9 gives the number of producers shipping each month for the 6-year period. It will be noted that there was a downward trend from January 1938 to September 1942, inclusive.

Table 9 and figure 1 show that, while the number of active shippers was declining, the total pool receipts were increasing steadily. The explanation is to be found in table 10, which gives the daily average shipment per farm by months. The increase in shipments per farm more than offset the decline in the number of shippers.

An important factor in any city milk supply is the seasonal variation of farm shipments. This is given for the period in figure 2. It is evident that a gradual increase in seasonal variation took place from 1938 to 1942. The last 2 years, 1942 and 1943, were almost identical. The greatest increase came in 1941 and 1942. It would seem significant that this came just after the abandonment of the base plan in January 1941. A further comparison is given in figure 3. Here three periods are compared. The 1925-1929 period preceded the introduction of the base plan in October 1934. The second period was one in which the plan was in effect. This shows a more even production than during the first period. The last period, 1941-1943, follows immediately after the abandonment of the base plan on January 1941. It is obvious that seasonal variation of shipments were greater in 1925-1929 than in the other periods. There is some evidence of a renewed widening in 1941-43 as compared with 1935-1940.

TABLE 7.—Total farm sales, use classification, and average prices paid producers in Stark County Pool, 1938-1943, inclusive

Pool year	Total pool receipts	Use classification		Average producer price
		Fluid milk and sweet cream	Milk for manufacturing	
	Pounds	*Per cent*	*Per cent*	
1938	62,812,086	49.70	50.30	1.72
1939	59,548,443	56.82	43.18	1.63
1940	61,011,058	60.08	39.92	1.76
1941	62,237,480	65.17	34.83	2.18
1942	64,664,891	66.83	33.17	2.61
1943	67,540,798	74.00	26.00	3.21

TABLE 8.—Retail milk prices by months in the Stark County Market Area, 1938-1943

Month	1938	1939	1940	1941	1942	1943
January	12	11-10	12-11	12-11	14-13	15-14
February	12	11-10	12-11	12-11	14-13	15-14
March	12	11-10	11	12-11	14-13	15-14
April	12	10	10	12-11	14-13	15-14
May	11	10	11-10*	12-11	14-13	15-14
June	11-10	10	10	12-11	14-13	15-14
July	11-10	10	10	13-12	14-13	15-14
August	11-10	11-10	10-11*	13-12	14-13	15-14
September	11-10	11-10	11	13-12	14-13	15-14
October	11-10	11-10	11	13-12	14-13	15-14
November	11-10	11	11	14-13	14-13	15-14
December	11-10	12-11	11-12*	14-13	14-13	15-14

*Prices changed during the month.

TABLE 9.—Producers selling through the Stark County Market Pool, by months, 1938-1943

Month	1938	1939	1940	1941	1942	1943
	No.	*No.*	*No.*	*No.*	*No.*	*No.*
January	1097	1053	996	966	905	947
February	1087	1052	996	965	902	942
March	1091	1040	999	942	899	944
April	1097	1014	988	922	910	934
May	1103	1015	983	926	909	946
June	1095	1016	985	927	908	949
July	1084	1017	981	924	915	958
August	1079	1008	979	921	914	968
September	1074	1009	975	915	918	970
October	1072	1010	980	916	930	967
November	1066	1000	969	912	943	955
December	1057	993	958	906	935	944
Average for year	1084	1019	982	928	916	952

Source: Records of Stark County Milk Marketing Board.

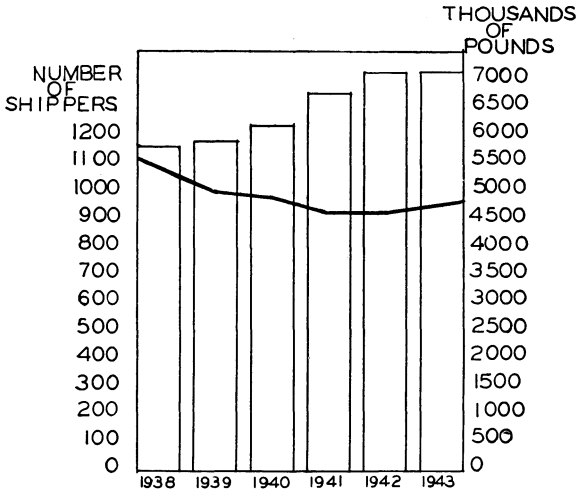

Fig. 1.—Average number of shippers and average shipments in pounds per year in Canton market, 1930-1943.

Withdrawals and additions of producers.—The greatest emphasis in this study has been upon the rate of change of shippers in the market and the effect of these shifts upon the milk supply. Data on additions and withdrawals were obtained from records of the Association and the Milk Marketing Board, from questionnaires mailed to producers and local leaders, and from personal interviews with truckers and others. The pool does not cover quite all sales of fresh milk and cream in the county. There were sales in all the towns by producer distributors and there were a few dealers of small volume that were not cooperating in the pool.

TABLE 10.—Daily average milk shipments per farm in Stark County Market Pool, 1938-1943

Month	1938	1939	1940	1941	1942	1943
	Pounds	*Ponnds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
January	142	154	150	162	176	175
February	149	158	159	167	184	184
March	156	167	166	176	198	197
April	167	172	178	196	216	213
May	194	193	199	222	244	238
June	189	190	206	218	235	238
July	165	163	183	193	203	204
August	160	157	169	192	195	200
September	153	146	170	184	183	190
October	145	139	158	166	167	165
November	139	138	144	161	157	160
December	145	144	153	167	165	169
Average for year	158	160	170	184	193	194

There was a small shifting back and forth between the pool and the non-pooling groups. These shifts were not actual gains or losses to the market as a whole, but they appeared as shipper changes in the pool records. Losses and gains on this score about balanced.

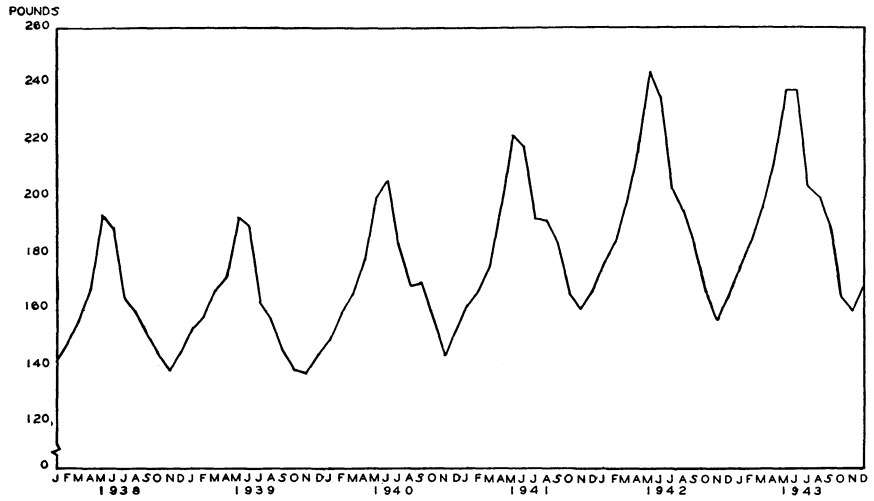

Fig. 2.—Daily average milk shipments per farm, Canton market pool, 1938-1943

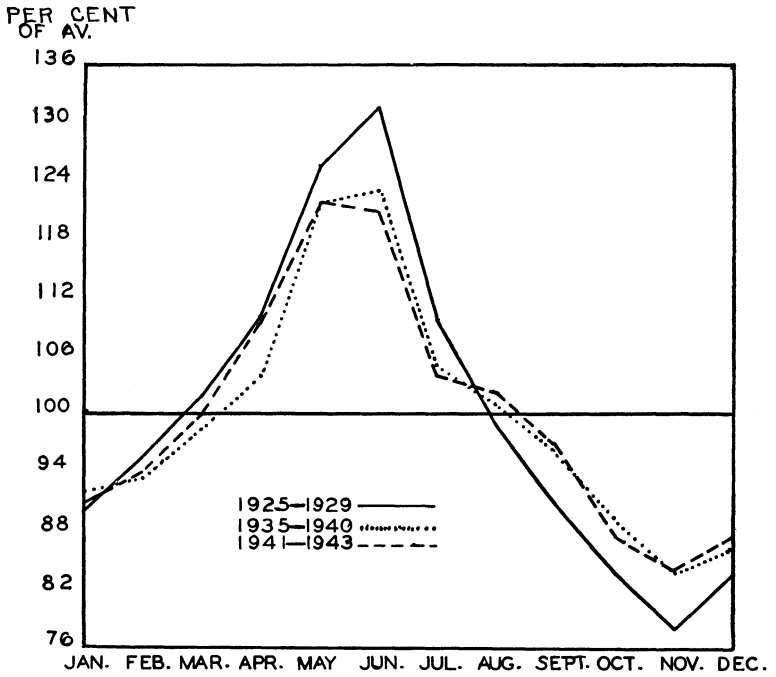

Fig. 3.—Seasonal variation of milk shipments in three periods, Canton market.

Table 11 is a classification of 617 shippers that appeared in the records as withdrawals. Definite reasons were obtained on 535. It is necessary to keep clearly in mind the distinction between farm and shipper withdrawals in an analysis of this character. Normally shippers who appear in the records as withdrawals greatly exceed in number the farms that disappear from the market. This results from the fact that when a man shifts from one farm to another or when a change of operators takes place on a farm, such as father to son, the original account is closed out in the records of the Milk Marketing Board and a new one set up. Shippers who were out for a while and then returned to the pool were not considered as withdrawals and are therefore not included in table 11.

TABLE 11.—Reasons given by shippers for withdrawing from the Stark County Milk Marketing Pool. 1938-1943

Reason	1938	1939	1940	1941	1942	1943	Total
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Retired, ill health, or death	25	33	25	42	46	33	204
To industry or other business	7	9	10	14	13	15	68
To other inspected markets	5	14	6	6	10	9	50
To manufacturing market	4	0	6	3	1	3	17
Changed type of farming	6	4	4	3	7	1	25
Shut off by Board of Health	5	10	17	12	6	7	57
Moved out of territory	8	6	3	5	11	7	40
In territory taken over by the dam	0	1	2	3	5	2	13
Draft of son or operator	0	0	0	1	0	3	4
Lack of help	0	0	1	2	0	4	7
Dropped in rerouting	0	0	0	0	1	3	4
Moved to farm in territory not meeting inspection	1	0	0	0	1	1	3
Selling to non-pooling dealer within the market	8	6	7	7	10	7	43
Reasons not known	20	13	5	13	13	18	82
Total	89	96	86	111	124	111	617

One of the large groups among the withdrawals is composed of those who were shut off by the Board of Health. Sanitary requirements were stepped up some during this period, and some producers were not able to meet them. Some of these men went to manufacturing outlets where the requirements were less rigid and it is probable that a considerable number changed to some other type of farming.

There were several other reasons, few as to numbers but quite important as far as the individual producer was concerned. Construction of a conservancy dam caused the abandonment of 13 farms that had been in the market. A few were left without transportation due to rerouting of truck routes to decrease mileage. It is significant that up to January 1, 1944 there were relatively few who gave joining the armed services as a reason for quitting. Thirty gave lack of labor and this also may have been the cause for some of those classified as retiring.

In table 12 there is a tabulation of the information that could be obtained on the farms involved in market withdrawals. The most significant fact brought out in this table is that 193 farms that shipped milk through the market pool during the period 1938-1943 were not producing milk in December 1943. The second largest group went to some manufacturing market. It may be significant in this connection that during a large part of this 6-year period

the price of milk for manufacturing was rising faster than that for city use. There were 59 farms lost to other fluid markets, mainly to Akron. There were only two farms known to have dropped from the pool to go into sour cream sales.

TABLE 12.—Present outlet of 524 farms which withdrew from the Stark County Market Pool, 1938-1943

Present outlet	1938	1939	1940	1941	1942	1943	Total
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
To other fluid markets	6	20	7	8	9	9	59
To manufacturing market	10	15	18	11	10	9	73
To non-pooling dealer in market	8	6	7	10	14	5	50
Cream	.....	.....	1	.....	.....	1	2
No production	28	25	31	39	39	31	193
No information	27	16	16	24	25	39	147
Total	79	82	80	92	97	94	524

The sources from which additions to the market pool were made are important in maintaining an adequate supply. These data are given in table 13. The greatest number of additions, 107, came from men new to the area. Attention is called again to the fact that this does not mean that 107 farms came into milk production that had not been on the market. Most of these were men who took over farms of former producers who were retiring. They had not previously been listed as shipping to the pool. Next in importance were those who came in from another city market or from a manufacturing plant.

TABLE 13.—Sources of additions to producer list in Stark County Market Pool. 1938-1943

Source	1938	1939	1940	1941	1942	1943	Total
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Shifted from a manufacturing market	1	5	4	10	25	29	79
Shifted from another city market	2	4	4	6	38	21	75
Changed to pool from retail sales or local dealer	1	6	7	5	17	12	48
Father to son or other farm shift	1	2	.....	.....	10	6	19
Shift to another farm in territory	2	2	.....	1	5	4	14
Started as new shipper in area	19	12	8	18	24	26	107
Came in from adjoining market area	4	5	3	6	11	7	36
No information	2	5	4	7	7	17	42
Total	32	41	30	53	137	122	415

By comparing tables 11 and 13 it will be noted that there was an interchange of producers between pooling and non-pooling dealers that in the end did not represent any significant shift in the market on a net volume basis. In table 14 sources are given for 267 farm additions to the market on which information was obtained. The largest number came from adjoining city or

manufacturing markets and represented a shift of both the farm and the shipper. It is evident when comparing this table with table 12 that the number of farms that went out of milk production far exceeded those that came into the market as new dairy farms within the area.

TABLE 14.—Source of 267 new farms added to the Stark County Market Pool

Source	1938	1939	1940	1941	1942	1943	Total
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Manufacturing market	1	5	4	10	25	29	74
Other inspected market	2	4	4	6	38	21	75
Change to pool from retail sales or local dealer	1	6	7	5	17	12	48
Former shipper on a new farm	2	2	.....	1	5	4	14
New dairy farm within area	.....	2	2	2	5	9	20
New shipper on new farm for Canton area	4	5	3	6	11	7	36
Total	10	24	20	30	101	82	267

In as much as all farms selling in the pool must meet Board of Health inspection those listed as coming into the market were asked what it cost them to prepare the farm premises to pass inspection by the Board of Health under whose supervision they came. Some of these farms had produced for this market or for some other city market at some previous time. There were 111 who gave information on this point. Their distribution in cost brackets is given in table 15.

TABLE 15.—Estimated cost of preparing to meet Board of Health inspection

Range of cost	Group average	Farms
Dollars	*Dollars*	*No.*
0- 149	64	38
150- 299	201	27
300- 449	338	12
450- 599	500	12
600- 749	650	5
750- 899	766	3
900-1049	970	5
1050-1199	1164	1
1200-1349	1215	4
Over 1350	1700	4
Total	.....	111
Average	371	.....

In order to determine more in detail what happens when a milk supply changes as this one did in the 6-year period, it becomes necessary to break down certain groups and study their records of daily shipments. A representative sample of the withdrawals was compared with those who came on to replace them. In a sample of 22 cases, in which the last full 12-month period of the shipper dropping out was compared with the first 12 months of shipments of the one who replaced him, it was found that in exactly half of the cases the one coming in exceeded in shipments the one that dropped out, but the total of shipments from those coming in was 1,428,269 pounds as compared with 1,305,345 pounds of those who dropped out. This was a gain of 122,924 pounds, or 10.9 per cent, as a result of the shift.

Another breakdown was made in which father to son changes were analyzed. In this comparison there were 12 cases. The fathers in the last 12 months on the market had an average annual shipment per farm of 64,646 pounds as compared with 82,458 pounds for the sons. This was an increase of 17,812 pounds per farm, or a percentage increase of 27.6 per cent, in favor of the sons.

When, instead of comparison by individual farms as above, the last year of farm shipments of all those who dropped out was compared with the first year's shipments of all who came in as additions, the relationship was found to be 2,861,754 pounds for the withdrawals as compared with 3,005,665 pounds for the additions. In terms of farm average, it was 48,504 pounds as against 58,935 pounds, an increase of 21.5 per cent in favor of the newcomers into the market.

DAYTON MARKET AREA

Characteristics of the area.—Dayton is located in a part of Ohio devoted largely to livestock, general crop, and tobacco farming. For many years the average daily milk shipments of farms supplying the Dayton market have been low when compared with other large cities of the State.

This market faced the most rapid recent increase in population of the four markets studied. In the last census taken as of April 1, 1940, Montgomery County had a population of 295,480. The Census Bureau estimate as of March 1, 1943 was 341,553, an increase of 46,073, or 15.6 per cent. This compares with an increase of 5.8 per cent in Stark County, of 5.9 per cent in Summit, and a loss of 15 per cent in Scioto County. The Dayton Chamber of Commerce made an estimate of an increase of 75,000 for a trading area with a radius of 20 miles from Dayton. This in some respects would better indicate the problems of milk supply because this trading area is served in the main by Dayton milk distributors.

If there had been no increase in per capita purchase by the original population it would have been something of a problem to provide the milk and cream needed for the newcomers. When both gain of population and increase in per capita milk consumption are considered, it becomes an outstanding supply situation.

A clear-cut picture of the problem can be obtained by a study of records of the market, combined with the population data given above. A study of milk and cream purchases by 540 families in Dayton in 1942 showed that a thousand persons would require 391 quarts of milk and 36 half pints of cream daily, equivalent to 931 pounds of 4 per cent milk. The pool records showed average daily sales of fluid milk and cream in April 1940 of 134,356 pounds and in August 1943 of 256,842 pounds. The increase of 122,486 pounds was required to care for both increase in milk purchases and needs of new population.

The 46,073 of new population added to Montgomery County would purchase approximately 42,894 pounds. The remaining 79,592 pounds were absorbed by increased purchases by the old residents and some new population served by Dayton dealers in adjoining counties.

In terms of farms required, the calculation should be on the basis of the period of lowest average daily sales. In November 1943, average daily sales per farm were 128 pounds. To provide 122,486 pounds of milk in the November ratio would require 957 farms. The analysis to follow will show how near the market was able to meet these requirements.

Industry program to meet supply problems.—Because of the great need for increased supplies of milk in the Dayton area there has been a well developed program on the part of the organized producers, the distributors, and the Dayton Health Department to meet the situation. Also, considerable work was done in cooperation with the Office of Defense Transportation toward rearrangement of milk truck routes to conserve tires and trucks and at the same time to maintain the supply.

It was decided that some milk from farms not under full inspection by the Department of Health could be used if rigid platform inspection were maintained. This was provided for in the following statement issued by the Dayton Commissioner of Health effective December 3, 1942.

> "Pursuant to the authority vested by law and specifically granted by Section 759-1 and Section 792 of the Code of General Ordinances of the City of Dayton, I, H. H. Williams, duly appointed Health Officer of the City of Dayton, do hereby declare a period of emergency in the Dayton Milk Market.
>
> I hereby issue and promulgate the following regulations with respect to the production, handling, pasteurization, and transportation of milk received for manufacture which may be used for other purposes.
>
> Reg. 1. The Health Officer shall be supplied with the names and addresses of all producers of milk received for manufacture or other purposes.
>
> Reg. 2. The vertical portion of the necks of all cans in which milk for manufacture, or other purposes is received shall be painted red.
>
> Reg. 3. (a) Milk received for manufacture when used for other purposes shall be from healthy cows, and show no abnormal conditions, and shall have an average bacterial plate count not exceeding 1,000,000 per c. c., or a comparable direct microscopic count, or an average reduction time of not less than 3½ hours when delivered to the pasteurization plant.
>
> (b) This milk shall be produced on premises on which buildings, installations, equipment, water supply, facilities, methods and procedures incident to production, handling, storage, and transportation of raw milk are such as to assure that there is delivered to the pasteurizing plant a wholesome milk.
>
> Reg. 4. All milk received for manufacture or other purposes and held for distribution to other pasteurizing plants shall be cooled to such a degree that the temperature during storage shall not exceed 50° F.
>
> Reg. 5. Milk received for manufacture and used as fluid milk or in other milk products shall be pasteurized by heating every particle of milk to at least 143° F., and holding at that temperature for at least 30 minutes, or to at least 160° F., and holding at such temperature for at least 15 seconds in approved and properly operated equipment.
>
> Promulgated in the City of Dayton, this third day of December 1942, to become effective immediately, in witness whereof my signature and seal of the Division of Health of the City of Dayton have been subscribed and affixed respectively."
>
> H. H. Williams, M. D.
> Commissioner of Health

Dealers worked out an arrangement in connection with the pool whereby the expense of bringing in additional milk by tank shipment was distributed equitably among all dealers cooperating in the pool.

The Association maintained at all times an aggressive attitude toward bringing into the market additional farms that were well situated for shipping city milk. Members of the Association Advisory Council were urged to keep in mind at all times the need for new shippers to replace the withdrawals. A meeting was held in the offices of the Association on August 20, 1943 for the purpose of assembling information on the outlook for future market receipts. Leading producers, feed dealers, and fieldmen reported on feed and labor conditions. The facts presented at this meeting were summarized and forwarded to the Office of Price Administration.

History of marketing plans.—The marketing plans in effect over the years preceding the period covered by this study may have some bearing upon producer behavior within the period.

The Miami Valley Cooperative Milk Producers Association came into existence as a cream cooperative in 1922. On April 1, 1923 the association began to function as a bargaining agency in the sale of fluid milk. From April 1, 1923 to December 31, 1924 producers received the average price in an association pool. From January 1, 1925 to March 31, 1928 there was a base and surplus plan with no pool. From April 1, 1928 to November 30, 1930 milk was sold on a flat price with neither pool nor base. From December 1, 1930 to September 30, 1931 the base and surplus plan with no pool was reinstated. Beginning with October 1, 1931 the market was again operated as an association pool with base and surplus.

When this market was operating under a base and surplus plan an attempt was made to limit bases assigned to producers so that total base deliveries would approximate closely dealer sales of fluid milk and cream. Beginning with October 1, 1931 and continuing to December 31, 1935 the formula established by joint action of the Sales Committee, Base Committee, and Distributors was as follows: Base-making period was the 3 lowest consecutive months of receipts. The percentage of producer sales for this period, which became the allotted base for the next year, was determined by comparing the lowest month of dealer sales for the year with the average dealer receipts for the 3 lowest consecutive months of producer deliveries.

A summary of pool operations for the year 1934 shows how the plan worked out in actual practice. Table 16 shows how deliveries of base milk

TABLE 16.—Summary of association pool operations in Dayton market, 1934

Month	Milk and cream sales	Base milk receipts	Per cent base milk was of sales	Total daily receipts	Per cent base	Per cent surplus
	Pounds	*Pounds*		*Pounds*		
January	136,919	124,898	91.22	183,802	67.95	32.05
February	136,829	133,693	97.71	181,734	73.56	26.44
March	140,981	123,312	87.40	183,448	67.17	32.83
April	143,299	130,837	81.95	202,120	64.73	35.27
May	147,690	135,557	91.78	254,967	53.16	46.84
June	147,518	140,918	95.53	248,705	56.66	43.34
July	144,280	135,435	93.87	223,671	60.77	39.23
August	138,396	157,582	99.41	240,802	57.89	42.11
September	137,137	143,514	104.65	233,608	61.43	38.57
October	137,545	137,784	100.17	217,334	63.39	36.60
November	140,632	139,278	99.04	201,987	68.95	31.05
December	136,388	134,278	98.45	199,342	67.44	32.56

compared with sales of milk and cream by dealers and also the amount of surplus over delivered base each month that went into manufacturing outlets.

It is significant that in only 2 months, September and October, were base milk receipts of dealers equal to sales of fluid milk and cream. The percentage of surplus delivered was about 10 per cent higher in the months of May to August, inclusive, than in the other 8 months.

On January 1, 1935 a new producers' association, The Buckeye Independent Farmer's Association, came into existence and requested recognition by the Ohio Milk Marketing Commission. Since that date, milk handled by this association has not been included in the pool operated by the Miami Valley Cooperative Milk Producers Association.

The base and surplus plan was dropped in the Dayton market in 1940. In November 1940 a quantity bonus was introduced on a basis of 5 cents per hundred premium for average daily shipments of 100 to 199 pounds and 10 cents for those shipments in excess of 200 pounds. In December 1940 an additional bracket was added beginning at 300 pounds. In January 1942 an additional bonus for quality of 10 cents per hundred pounds was added.

The manner in which these premiums functioned is shown in the following price announcement for milk shipped in December 1943:

Daily average shipments	Per cent	Price
1 to 99 pounds	25	$3.36
1 to 99 pounds, plus quality		3.46
100 to 199 pounds	39	3.41
100 to 199 pounds, plus quality		3.51
200 to 299 pounds	17	3.46
200 to 299 pounds, plus quality		3.56
300 pounds and over	19	3.51
300 pounds and over, plus quality		3.61

As a result of this system of paying the maximum difference in returns between two shippers with milk of the same butterfat content is 25 cents.

Questionnaires were sent to farmers who appeared in the records as withdrawals from the market. Each was asked to express his opinion with respect to the base and surplus plan as compared with the present bonus plan. Many of these farmers had sold only under one or the other of the plans and not both and were not able to make a comparison from their own experience. Of the opinions expressed, there was a ratio of approximately 2 to 1 in favor of the bonus plan. The reasons most often given were that it was (1) more fair, (2) easier to work under, and (3) the returns were better. The fact that prices have been rising since the bonus plan was adopted tends to throw a bias in its favor on the last reason given. Those who expressed preference for the base and surplus plan said: (1) that it did not penalize the small producer and (2) that it tended to induce heavier fall production when the market was short of milk.

Market trends in number of shippers and milk supply.—An over all picture of the market pool is needed as a background for the data on individual producer withdrawals and additions. In table 17 the receipts of milk from shippers, the division into fluid and other sales, and the average prices received by farmers for 4 per cent milk are given for a 5-year period.

TABLE 17.—Total milk received from shippers, use classification, and average price paid shippers in Dayton, 1939-1943

	Total milk received from shippers	Use classification		Average shipper price*
		Fluid sales to dealers	Other sales	
	Pounds	*Per cent*	*Per cent*	
1939	68,193,254	69.6	30.4	$1.80
1940	67,323,089	74.5	25.5	1.92
1941	74,145,200	81.1	18.9	2.29
1942	84,793,597	83.8	16.2	2.67
1943	78,557,898	91.5	8.5	3.22

*Simple average of shippers' average monthly prices.
Source: Records of the Miami Valley Producers Cooperative Association.

Here, as in other markets in industrial areas, there was an upward trend in receipts, in percentage going into fluid sales, and in farm prices.

In table 18 the average number of shippers is given by months and in table 19 the average daily sales per farm. The decline in receipts in 1943 as compared with 1942 can be accounted for in the decline in both the number of shippers and in the daily sales per farm, as shown in tables 18 and 19.

TABLE 18.—Number of shippers as reported for the Dayton market pool, 1939-1943

Month	1939	1940	1941	1942	1943
January	1652	1482	1472	1413	1470
February	1618	1495	1469	1460	1452
March	1652	1511	1450	1482	1488
April	1605	1476	1450	1467	1469
May	1605	1477	1493	1476	1486
June	1608	1481	1477	1473	1451
July	1578	1493	1460	1476	1457
August	1538	1481	1445	1465	1441
September	1515	1484	1445	1508	1415
October	1523	1491	1430	1503	1415
November	1507	1483	1426	1496	1418
December	1494	1487	1396	1499	1419

TABLE 19.—Daily average milk shipments per farm in Dayton market, 1939-1943

Month	1939	1940	1941	1942	1943
January	99	108	118	141	135
February	104	116	124	148	145
March	113	122	130	157	155
April	121	127	144	169	162
May	149	152	174	196	190
June	145	159	164	187	190
July	131	141	151	170	156
August	126	123	145	166	164
September	111	118	138	165	158
October	101	108	129	141	136
November	97	102	126	127	124
December	102	110	130	127	127

The increase in returns to shippers was due in part to increase in the percentage of fluid sales and in part to rising retail prices as shown in table 20.

TABLE 20.—Retail milk prices by months in the Dayton market, 1939-1943

Month	1939	1940	1941	1942	1943
January	11	11	11	14	14.5
February	11	11	11	14	14.5
March	11	11	11	14	15
April	11	11	11	14	15
May	10	11	11.3	14	15
June	10	11	12	14	15
July	10	11	12	14	15
August	10–11	11	13	14	15
September	11	11	13	14	15
October	11	11	13.8	14	15
November	11	11	14	14	15
December	11	11	14	14	15

Source: Reports of the Miami Valley Cooperative Milk Producers Association.

Producer withdrawals and additions.—In the Dayton area the number of withdrawals from the market was large regardless of the fact that demand was running ahead of the ability of the shippers in the market to meet it. In table 21 there is a breakdown of 930 names that appeared in the records of the market as withdrawals sometime between January 1, 1939 and December 31, 1943.

TABLE 21.—Reasons for withdrawal of shippers from Dayton market, 1939-1943

Purpose	1939	1940	1941	1942	1943	Total
Deceased, retired, ill health, or sold out	71	31	53	53	35	243
Other employment	15	16	19	12	11	73
Selling in other inspected market	4	4	18	12	3	41
Selling in manufacturing market	18	9	9	3	4	43
Changed type of farming	19	5	12	16	8	60
Shut off by Board of Health	45	31	29	17	12	134
Moved out of territory	14	13	10	11	11	59
Draft of son or operator	0	0	0	7	4	11
Lack of help	3	2	3	8	12	28
Dropped in rerouting	3	2	1	7	9	22
Moved to a farm in territory not meeting inspection	10	8	5	4	2	29
Dissatisfaction with market	6	4	11	9	2	32
Disease in herd	3	0	3	5	1	12
Still shipping	27	16	30	39	31	143
Total	238	141	203	203	145	930

It is obvious that in obtaining information of this nature there will be some overlapping between cause and effect. If, for instance, a producer is shut off by the Board of Health and he goes to a manufacturing plant, the reason in table 21 might appear either as shut off by Board of Health or changed to manufacturing market, but in no case would it be reported in both classifications. Retirement is another classification that may be the result of a cause such as lack of help or opportunity for other employment. The reasons are listed in the table as they were given by those who answered the inquiries.

The classification "still shipping" includes some who dropped out and returned to the market within the 5 years, some who shifted to non-cooperating dealers in the market, and some in which a change was made in the name appearing on the records but no actual loss of milk shipments took place.

It is helpful to make certain groupings of the reasons given in table 21. It is safe to assume that practically all of the 243 in the first section are now out of production. Those who moved out of the territory and those dropped in truck rerouting are lost as shippers to this particular market. Most of those in the remaining classifications might be considered as potential shippers if the conditions that induced them to withdraw were changed.

An effort was made to determine the status in 1943 of those who had withdrawn sometime in the 5-year period. Data were obtained on 645 of the 930 shippers listed in table 21. In this analysis an effort was made to distinguish between those who stayed in the Dayton area and those who moved outside. This information is given in table 22.

TABLE 22.—Status in 1943 of shippers who withdrew from Dayton market, 1939-1943

Status	1939	1940	1941	1942	1943	Total
Out of milk production; stayed on farm	41	18	33	45	33	170
Out of milk production; moved from farm	57	33	41	35	30	196
Selling to manufacturing plant	43	33	34	22	23	153
Selling inspected milk in another city	7	5	16	20	12	60
Selling cream for manufacture	10	4	1	2	3	20
Still in market, with non-cooperating dealer	11	3	16	6	3	39
Selling as or to a producer distributor	1	.....	2	1	1	5
Total	169	97	143	131	105	645

The large number who withdrew from the market but stayed on the farm and were reported as having no milk production is significant. The replies to the questionnaires indicated that many of these were farmers who had reached advanced age and were not able to carry on the exacting work of a dairy farm. Many of the farmers who went into other employment in this area remained on the farm and are included in this figure. This was most pronounced in Montgomery and Greene Counties.

Analysis of farms that disappeared from the market.—It was possible to trace accurately 500 farms that changed status in some manner in the 5 years covered in the survey. This information is given in table 23. The largest group was made up of those whose production of milk or cream for the market was discontinued. The high point in years was reached in 1942. The second most important loss to the market was of farms that shifted over to some manufacturing plant. Several reasons were given for these shifts. The one most frequently mentioned was difficulty with the Board of Health. This

TABLE 23.—Status in 1943 of 500 farms that appeared in 1939-1943 as withdrawals in the market records

Status	Year change occurred					
	1939	1940	1941	1942	1943	Total
Not now producing milk	33	20	43	52	32	180
In the manufacturing market	41	30	28	14	12	125
Selling under inspection in another city	9	3	33	21	8	73
Selling cream	7	5	1	2	2	17
In market but not in pool	11	5	16	15	8	55
In market with a different operator	9	6	10	13	12	50
Total	110	69	131	117	74	500

reached its height in 1939, 1940, and 1941 following a ruling requiring a larger milk house than had been required up to this time. Of 41 cases in these 3 years where the farm was shifted to some other market outlet, 23 farmers said it was because they could not or would not build a larger milk house.

It is significant that, in this territory where production of sour cream for sale to butter factories is still a very important farm enterprise, there were only 17 of these 500 farms that changed in the 5-year period from sale of milk to sale of butterfat or sour cream.

The last two classifications include farms that did not actually disappear from the Dayton market. There were 55 cases in which the shift was to a dealer not in the market pool or in which the farmer began selling at retail. There were also 50 farms that remained in the market but under a different name. It is probable that there were other cases of this kind but it was not possible to obtain exact information on them. The rate of loss of farms from the market was higher in 1941 and 1942 than in 1943.

Additions to the market.—The Dayton area was the most difficult in which to compile accurate information as to source of additions to the market. This was due in part to the arrangement with respect to farm and platform inspection discussed above. It was very difficult to separate shifts within the market area from bonafide additions of new shippers. Shifting between pooling and non-pooling dealers added to the confusion.

In table 24 is a sample of sources from which additions were made to the market. These data were obtained from inquiries sent by mail to shippers who appeared as additions in the market records in the years 1939 to 1942, inclusive.

TABLE 24.—Sources from which some additions were made to the Dayton market, 1939-1942

Source	1939	1940	1941	1942	Total
Manufacturing market	12	11	12	7	42
Another inspected city market	5	1	3	7	16
To pool from non-pooling dealer	4	3	2	2	11
New shipper of inspected milk	5	4	6	5	20
Change from sale of butterfat	3	8	2	1	14
					103

While the above shippers represent only a small part of the additions to the market they provide a true cross section. Table 24 shows that the greatest additions to the Dayton milk supply have come from the patrons of the milk manufacturing plants operating in the territory.

Opinions obtained by field survey.—All the important counties shipping milk to the Dayton market were visited. Interviews were held with representatives of the Agricultural Adjustment Administration, Farm Security Administration, County Agricultural Extension Service, and milk producers. Sentiment differed to some extent as to the probability of any substantial increase in farm shipments to the Dayton market. The factors tending to hold back expansion and, in some cases, to reduce milk output were mainly lack of labor and more favorable returns, all factors considered, from the sale of hogs and beef cattle.

One pronounced indication of effort to overcome the labor shortage was the large sale of milking machines reported in all counties visited. One local

agent reported the sale of 114 machines in 1942. He did not, however, see in this a likelihood of increase in milk to be shipped from these farms.

In Clinton County where hog production is very important, the Agricultural Extension Agent did not look for any material increase in shipments of city milk from Clinton County farms. He reported that farmers selling butterfat seemed well satisfied.

In Miami County where the United States standard health ordinance was in effect a peculiar condition was found. The Dayton market had been approximately 15 cents higher than Troy and Piqua and there had been a tendency for farmers to shift to the Dayton market after they had qualified under the standard ordinance. As a result, it was necessary to develop new shippers for the local markets.

In the outer edges of the milk shed where competition of the manufacturing plants was keenest there was a considerable amount of shifting of producers from one outlet to the other. This had a disturbing effect upon transportation. No effort was made to measure the actual differences in returns but the fact that the shifting took place in both directions would indicate that the difference was not great.

PORTSMOUTH MARKET AREA

Scioto County is considered here as comprising the Portmouth market area. All the milk-purchasing population of the county is served by dealers that purchase from the Scioto County Cooperative Milk Producers Association, excepting that served by a small number of producer distributors.

This market has differed from the other three markets in this study since 1940 as regards population movement. Scioto County dropped in population from 86,565 on April 1, 1940 to 73,546 on March 1, 1943. This was a loss of 15 per cent. The other market areas had substantial gains in population.

Producer cooperation in milk marketing began in the area in 1924 with the organization of the Scioto County Cooperative Milk Producers Association. By 1933 the market had reached a status in which all dealer purchases were through the association and it is still on that basis.

TABLE 25.—Number of shippers and volume of farm shipments in Portsmouth market area, 1934-1943

Year	Beginning of year	Additions	Withdrawals	Average for year	Total for year	Per shipper*
No.	*No.*	*No.*	*No.*	*No.*	*Pounds*	*Pounds*
1934	254	3	11	250	11,618,105	46,472
1935	246	14	28	239	11,391,391	47,663
1936	232	6	38	216	12,007,405	55,590
1937	200	7	22	192	11,380,422	59,273
1938	185	14	15	184	12,127,377	65,910
1939	184	9	9	184	12,571,913	68,326
1940	184	8	11	182	12,998,373	71,420
1941	181	4	8	179	13,308,924	74,352
1942	177	12	16	175	13,249,642	75,712
1943	173	9	19	168	12,899,381	76,782
		86	177			

*Total sales divided by average number of shippers for the year.

The study of this market covers the 10 years of 1934 to 1943, inclusive. Total milk purchased by dealers from the association in this period fluctuated in round numbers between 11¼ and 13¼ million pounds annually. Table 25

shows these sales by years with the number of active shippers. In figure 4 the market picture is shown graphically.

The increase in milk sales, coupled with a decrease in the number of shippers shown in table 25 and figure 4, can be accounted for to a great extent by the operation of the base and surplus plan in the market. Members of the association when withdrawing from the market were permitted to sell their bases to other members. Many shippers were in a position to increase herds and there was a steady increase in market demand through the years 1935 to 1941, inclusive. There were several increases in base allotted to the entire membership but this did not give all members as much base as they desired.

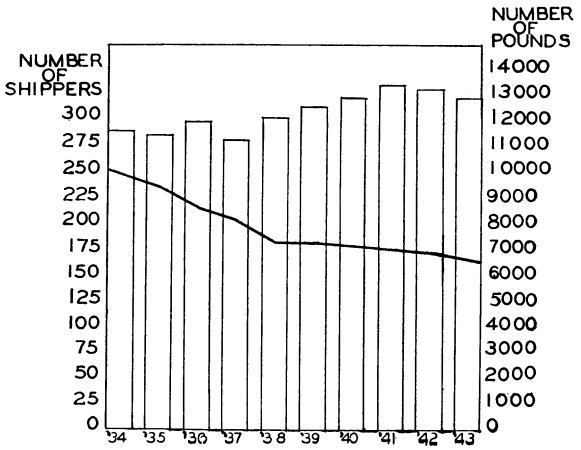

Fig. 4.—Average number of shippers and average shipments in pounds per year in Portsmouth market, 1934-1943.

The demand within the membership for additional allotted base was created by the desire of those shippers favorably situated to have a larger share of the fluid milk market and a willingness on the part of those not so faborably situated to shift to some other market. When the difference in the prices between Class I and Class III milk was wide and sales were expanding, base sold at from $3.00 to $5.00 per pound of daily allotment. When the price of milk for manufacturing rose in 1942, the price of base dropped to 50 cents per pound. Data on 8 years of operation of the base and surplus plan in this market are given in table 26. Allotted base figures were not available for 1934 and the plan was suspended in April 1943.

The effectiveness of a base and surplus plan as a means of adjusting total supply to market demand can be measured by the amount of excess over base that all producers in the pool deliver. The effectiveness of the plan as a means of paying farmers in accordance with their ability to produce as the market requires can be measured by the percentage of allotted base that is delivered month by month. The percentage of milk delivered as base milk is high as compared with most markets operating under base plans. (Top line in table 26). Line three also shows an unusually high percentage of allotted base

delivered. Such percentages have not normally been reached under Ohio marketing conditions without the exchange of allotted base among shippers as described above.

TABLE 26.—Performance of producers with respect to deliveries of base milk

	1935	1936	1937	1938	1939	1940	1941	1942
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Milk delivered at base	80.5	86.6	88.7	89.4	87.4	92.2	89.2	84.5
Milk delivered as excess	19.5	13.4	11.3	10.6	12.6	7.8	10.8	15.5
Allotted base delivered	98.6	98.3	98.3	98.5	98.3	99.3	99.3	97.8
Allotted base undelivered	1.4	1.7	1.7	1.5	1.7	0.7	0.7	2.2

Analysis of withdrawals.—There are 177 withdrawals shown in table 25. In order to measure the effect of these it is necessary to analyze them as to what happened when the producer withdrew. In table 27 the reasons are given for withdrawal from the market pool of these 177 shippers. Note that 47 of them changed to another market; of this number 40 went to a manufacturing plant. In 1936 there was heavy demand for increased production of evaporated milk and 19 withdrawals in that year went to the M & R Dietetics Laboratories of Columbus, Ohio. At about this same time, the association was rearranging truck routes and there were in 1935, 1936, and 1937 eleven shippers who left the market because their milk could not be hauled economically in the new transportation pattern.

TABLE 27.—Reasons for shipper withdrawals from milk pool of Scioto County Milk Producers Association, 1934-1943

Reasons	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	Total
Changed to a manufacturing market	3	5	19	5	2	2	1	1	2	.....	40
Changed to another city market	1	1	1	1	1	.....	.....	.....	1	1	7
Continued to sell in local area	1	1	.....	1	.....	.....	.....	1	.....	1	5
Retired or failed	2	8	8	7	6	4	2	3	7	14	61
Died	1	5	2	1	1	2	6	2	2	1	23
Went into other employment	1	1	4	1	.....	.....	.....	1	2	.....	10
Changed type of farming	1	1	1	1	1	.....	2	.....	1	1	9
Hauling difficulties	.....	5	2	4	1	1	.....	.....	.....	.....	13
Miscellaneous	.....	.....	.....	1	2	.....	.....	.....	.....	1	4
Total	11	28	38	22	15	9	11	8	16	19	177

There were two periods when retirements ran somewhat heavier than average. These were 1935 to 1937 and 1942 and 1943. The five farms that continued to sell in the local area either started as producer distributors or sold to a producer distributor.

The miscellaneous classification includes those who had herd difficulties, were shut off by the Board of Health, and one shipper who was inducted into the Army. The local Agricultural Extension Service was successful in presenting data that resulted in deferment of all men who were engaged in dairy farming, with this one exception.

It is important not only to follow the producer changes but also to trace the farms. The 177 withdrawals classified in table 27, involved 169 farms. At the time of the survey 50 of these farms were still selling milk in this market pool, 43 were selling in some other market, and 76 were out of milk

production. Of the 177 producers listed in table 27, 51 were in milk production and 126 were not. It is significant that, in 1943, 55 per cent of the farms involved in producer withdrawals were still producing milk; whereas only 28 per cent of the original shippers were.

Analysis of additions to market.—Additions to the active shipper list in this market came from several sources. In table 28 the 86 additions to the producer list are broken down into classes by years. These 86 producer additions represented 30 farms that came on as new farms in the market. The remainder were adjustments within the farms already shipping to the market. The eight that changed from producer distributors to shippers to the market pool more than balanced the five that changed in the opposite direction. There was a net gain to the pool of three farms in this shifting within the production area.

TABLE 28.—Additions of shippers to the market pool, 1934-1943

Source	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	Total
Change of operator on farm	2	5	3	.....	5	3	2	2	.....	.....	22
Changed over from manufacturing market	.....	.....	.....	.....	.....	2	.....	.....	8	5	15
Farm new in market milk production	.....	.....	1	2	4	2	1	.....	2	3	15
Changed over from producer distributor	.....	1	.....	3	3	.....	.....	.....	.....	1	8
Old farm returned to the market	1	2	.....	.....	.....	.....	1	2	.....	.....	6
Shift of operator within family	.....	6	3	1	2	2	4	.....	2	.....	20
Total	3	14	7	6	14	9	8	4	12	9	86

One of the objectives of this study was to determine whether problems of maintaining milk supply were changing as the war emergency continued. On this point the farm sales of milk the last quarter of 1943 were compared with those for the same period in 1941 and 1942. If changes are taking place, it is also significant to know whether they are evenly spread over all types of dairy farms within the milk shed.

In table 29 a comparison is drawn between the fall-quarter sales of 1942 and 1943 of the entire association and those of the four largest farms that in 1942 accounted for approximately one-eighth of the association's total sales.

TABLE 29.—Farm sales of October, November, and December of 1943 compared with same months of 1942

	Entire market farm sales			Four largest farms Total farm sales			Per cent of the market in 4 large farms	
	1942	1943	Per cent decline	1942	1943	Per cent decline	1942	1943
	Lb.	*Lb.*		*Lb.*	*Lb.*			
October	1,030,907	901,724	12.5	137,719	90,812	34.1	13.2	10.1
November	977,336	841,929	13.9	131,764	84,082	36.2	13.2	10.0
December	1,061,768	925,594	12.8	124,134	89,912	27.6	11.7	9.7

This table shows that the four large farms experienced about three times the average market decline in October and November and about twice as much in December. The owners of these farms gave labor as the factor of most importance in this decrease of sales. Feed was second in importance.

COMPARISON OF THE FOUR MARKETS

Some of the most significant results of the study can best be shown by bringing the data on all four markets together so that certain contrasts stand out.

TABLE 30.—Market receipts from shippers, 1941, 1942, and 1943

Period	Akron	Canton	Dayton	Portsmouth
	Pounds	*Pounds*	*Pounds*	*Pounds*
Year 1941	91,647,850	62,237,480	74,145,200	13,308,924
October, November, December, 1941	23,276,083	13,796,199	16,929,978	3,087,792
Year 1942	92,939,220	64,664,891	84,793,597	13,249,642
October, November, December, 1942	22,833,700	14,036,571	18,191,992	3,070,010
Year 1943	97,507,925	67,540,798	78,557,898	12,899,381
October, November, December, 1943	22,311,952	14,473,940	15,171,446	2,669,247

Fall-quarter shipments in 1941, 1942, and 1943.—The first of these comparisons is given in table 30. Here the total market receipts for the years 1941, 1942, and 1943 are shown and also those for the months of October, November, and December. Akron and Canton had increasing total receipts for the full years, but Akron had declining fall-quarter receipts; whereas, Canton showed a slight increase in both 1942 and 1943. Portsmouth without the pressure of increased population had a slight decline.

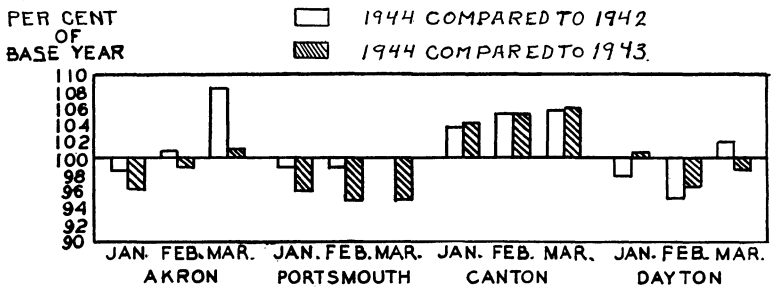

Fig. 5.—Milk sales per day per shipper of the first 3 months of 1944 compared to the corresponding months of 1942 and 1943 for four Ohio markets.

Dayton lost in the fall-quarter receipts in 1943 when compared with 1941 but gained in the full year. A careful study of this table points clearly to the tendency for the farm sales of the months of October, November, and December to fall short of their former relation to the full year's shipments. All of these markets were on base and surplus plans and went off of them previous to or during this 3-year period. There is no way to prove a definite cause and effect relationship between market plans and total shipments without a much more detailed analysis. Many men in the industry believe abandonment of base and surplus plans have been the principal cause of this shift.

Winter-quarter shipments in 1942, 1943, and 1944.—In table 30, a comparison was made of the fall-quarter market receipts of 1941, 1942, and 1943. As this study was being concluded, market reports of the four markets were

available for the first 3 months of 1944. This makes it possible to extend the comparisons one quarter farther. In table 31 these fall- and winter-quarter comparisons are given.

TABLE 31.—Market receipts from shippers in fall and winter quarters compared

Period	Akron	Canton	Dayton	Portsmouth
	Pounds	*Pounds*	*Pounds*	*Pounds*
October, November, December, 1941	23,276,083	13,796,199	16,929,978	3,087,792
January, February, March, 1942	23,510,114	15,109,839	19,232,942	3,189,445
Increase	233,931	1,313,640	2,302,964	101,653
October, November, December, 1942	22,833,700	14,036,571	18,191,992	3,070,010
January, February, March, 1943	23,421,423	15,765,628	19,275,414	3,135,040
Increase	587,723	1,729,057	1,083,422	65,030
October, November, December, 1943	22,311,952	14,473,940	15,171,446	2,669,247
January, February, March, 1944	24,592,925	16,792,633	16,987,015	2,955,750
Increase	2,280,953	2,228,693	1,815,569	286,503

In total market receipts from producers there is in all markets except Dayton a much greater gain in receipts of the first quarter of 1944 over the fall quarter of 1943 than there was in the winter of 1942 over the fall of 1941. These comparisons by quarters may take on added significance when it is possible to compare the spring quarters with the preceding fall quarters.

In table 32 a month by month comparison of the winter periods of 1942, 1943, and 1944 is made on the basis of average daily shipments per producer.

TABLE 32.—Average daily shipments per farm for January, February, and March of 1944 compared with same months in 1942 and 1943

Month	Daily shipments for farms			Percentage change	
	1942 Pounds	1943 Pounds	1944 Pounds	1944 over 1942	1944 over 1943
Akron					
January	175.1	180	173	−1.14	−3.89
February	180.1	184	182	+1.11	−1.09
March	180.1	194	196	+8.89	+1.03
Total	535	535	551	+2.99	−1.25
Canton					
January	176	175	182	+3.4	+4.0
February	184	184	193	+4.9	+4.9
March	198	197	209	+5.5	+6.0
Total	558	556	584	+4.6	+5.0
Dayton					
January	139	135	136	−2.2	+0.7
February	147	145	140	−4.8	−3.5
March	157	155	153	+1.9	−1.3
Total	443	435	429	−1.6	−1.4
Portsmouth					
January	198	204	196	−1.1	−4.0
February	200	209	198	−1.0	−5.3
March	201	212	201	0	−5.2
Total	599	625	595	−0.7	−4.8

Because of changing numbers of shippers in the market these comparisons do not run parallel with those of the total market receipts from producers. In this comparison Akron and Canton show gains in 1944 over 1942 for the quarter. Dayton and Portsmouth were below for the quarter, but Dayton showed a slight increase in March. In plans to meet the problems of market supply both total receipts and average daily shipments must be taken into consideration.

Farms with large average daily shipments.—There was much comment in the markets regarding the greater strain on the farms with the larger average daily shipments. Since the fall months comprise the critical period of milk supply in the markets studied, it was decided to set up a test on this point covering the months of October, November, and December in 1941, 1942, and 1943.

In table 33 the average daily sales in these years of a group of shippers with large shipments are compared with the average daily shipments of all shippers in the market. Daily averages were used to eliminate the effect of changing numbers of shippers in the market.

The contrast is most striking in the Portsmouth market where the four shippers chosen in 1941 had approximately 13 per cent of the sales of the market. These farms dropped over 40 per cent in production when 1943 was compared with 1941. The heavier loss of the 2 years was in 1943, when their average daily sales fell off more than 300 pounds. Labor was the controlling factor in the change on these farms.

Canton came next to Portsmouth in size of shipments from the selected farms. These farms showed the heaviest decline in October and well beyond that of the market as a whole. A more significant fact, however, is their continued downward trend in November and December of 1943, whereas the market as a whole showed an increase in daily shipments per farm in 1943 over 1942.

Akron varied from the pattern in Canton and Portsmouth by showing an increase in the selected farms in October when the market as a whole showed a slight decrease. In November and December, however, these farms followed the pattern of the other markets and had average daily shipments relatively lower than the market as a whole.

In the Dayton comparison the picture is different because of the poor showing made by the farms of larger shipments in 1942. Their decline of 15.79 per cent in November and of 11.01 per cent in December 1942 was considerably greater than the market as a whole. 1943 sales showed some increase over 1942 but not enough to make up the heavy drop in 1942 from 1941.

This table shows, when 1941 fall sales are used as a bench mark, that in all markets the farms with large daily shipments were well behind the market as a whole. It would seem to be a matter of importance if this trend should continue. It must mean that these farms with larger herds are now being operated somewhat below capacity as far as milking cows are concerned.

The cooperative leaders believed that most of the cows sold from the larger herds were purchased in the local milkshed by farmers with smaller herds. For a time following the provision with respect to a minimum of 16 livestock units to qualify for agricultural deferment under draft boards many of these cows went to bring herds up to the minimum.

If volume of farm shipments were to make a permanent shift from the larger units to smaller ones, it might make some differences in the market supply. It raises the question whether these cows in smaller herds would produce the same amount of milk and whether they would produce with the same seasonal variation as they would in larger herds.

TABLE 33.—Average daily farm receipts of entire markets compared with groups of farms with large average daily shipments

Month	Entire market			Change from		Farms of large daily shipments			Change from	
	1941	1942	1943	1943 over 1941	1943 over 1942	1941	1942	1943	1943 over 1941	1943 over 1942
	Pounds	Pounds	Pounds	Per cent	Per cent	Pounds	Pounds	Pounds	Per cent	Per cent
Akron										
October ...	168	172	168	—0.42	—2.95	481	488	493	+2.49	+ 1.02
November.	167	171	157	—5.96	—7.94	473	494	456	—3.59	— 7.69
December.	171	174	164	—4.26	—6.12	473	526	473	0.00	—10.08
Canton										
October ...	166	167	165	—0.61	—1.20	643	588	546	—15.09	—7.14
November.	161	157	160	—0.62	+1.90	577	574	562	— 2.60	—2.10
December.	167	165	169	+1.20	+2.40	576	585	560	— 3.00	—4.28
Dayton										
October ...	130	141	136	+4.62	—3.55	462	429	423	— 8.45	—1.40
November.	126	127	124	—1.59	—2.36	494	409	416	—15.79	+1.71
December.	133	127	127	—4.52	0.00	518	434	461	—11.01	+6.22
Portsmouth										
October ...	194	191	176	— 9.28	—7.86	1220	1110	732	—40.00	—34.06
November.	191	187	171	—10.48	—8.56	1250	1098	701	—43.92	—36.16
December.	196	198	183	— 7.64	—7.58	1285	1001	725	—43.58	—27.58

CONCLUSIONS

The 5 years 1939-1943 are included in all the markets studied and in two markets records for a longer period were available. The years preceding 1939 had been a period of increasing total shipments of milk to these markets. All markets were operating then under some form of base and surplus plan and there had been a trend toward less seasonal variation in shipments.

Soon after 1939 the supply situation began to change, due to shifting of population for employment in defense plants. Of the four markets, Dayton and Akron experienced the greatest increase in demand for milk. By the fall of 1942 these markets had demand in excess of total farm shipments, and in 1943 the shortage was still greater.

Changes in market plans were made that are significant. As city sales increased desire developed on the part of producers to do away with the base and surplus plan and thus to relieve the shipper of the necessity of taking a lower price for his "surplus" milk. One after another, beginning with Dayton and ending with Portsmouth, the markets abandoned the base and surplus plans. Dayton introduced a quantity bonus plan to induce more shipments throughout the year. From 1939 through 1943 there has been an increase in average shipments per day but seasonal variation of shipments has increased to a marked degree. This is a matter of real concern, because wide seasonal variation adds to the difficulties and the costs of the market milk business.

The period of withdrawals of producers in largest numbers came in 1941 and 1942. The most important reason for withdrawal from all these markets was retirement, including illness and death. Increasing demand did not turn the tide of retirement, but it appeared to induce those who remained in the market to increase their volume of shipments.

The producers whose average daily shipments were much larger than the average of the market did not hold their relative position. Reasons given were the difficulty of maintaining an adequate labor force. Those with shipments below the average were more inclined to withdraw by retirement than were those in the middle brackets. The increase in shipments, therefore, came as a result of larger average shipments from farms with medium size of herd.

With dealers' sales limited by War Food Order 79 it would appear that these cities will not have great difficulty with milk supply for about 9 months of the year. Several factors work together to make fall production relatively lower and this may create some tight supply situations in the fall months. A return to some form of base and surplus plan holds the greatest promise for solving this problem.